Forest Health Technology
ENTERPRISE TEAM UPDATE

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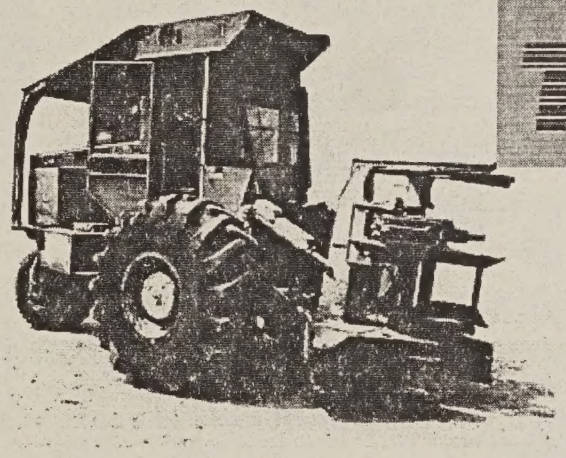
AUTUMN 1998

Team leverages resources

Small projects reap big rewards

Imagine you are a forest manager with a problem. Let's say you need to do a partial cut in a conifer forest in the South, where feller-bunchers are customarily used for such tasks. But you want to ensure against the spread of annosum root rot, which is present in the stand. You know that annosum root rot is caused by a fungus, *Heterobasidion annosum*, which colonizes readily on freshly cut stumps from spores carried by wind and rain. The best way to control it in partially cut stands is to apply Sporax, a commercial powdered formulation of borax, to each freshly cut stump. But the expense and manpower required to accomplish this after completing the cutting operation is daunting. Wouldn't it be great if there were a way to cut the tree and apply Sporax to the cut stump in the



Sporax Applicator for Feller-Bunchers

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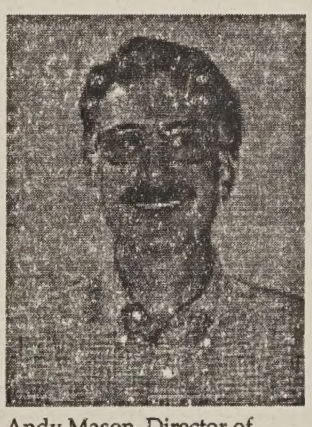
Inside . . .

Director Mason brings perspective, experience

Andy Mason, formerly Supervisory Natural Resource Manager in the Supervisor's office at Colville National Forest, replaced Bov Eav as director of the Forest Health Technology Enterprise Team-Fort Collins in mid-October. He brings with him a unique perspective—that of an end-user—and extensive experience in building relationships among Forest Service and other cooperators. These qualities suggest the focus of his leadership of the Enterprise Team.



Andy Mason, Director of Forest Health Technology Enterprise Team-Fort Collins, joined the Team in mid-October, 1998.

Mason's 20 years of experience give him a perspective unique to Enterprise Team leaders in that it spans not only National Forest experience in the Northern and Pacific Northwest Regions,

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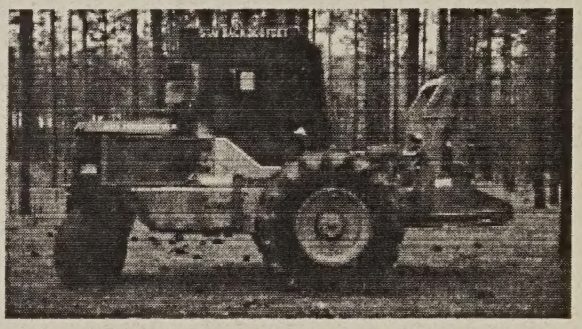
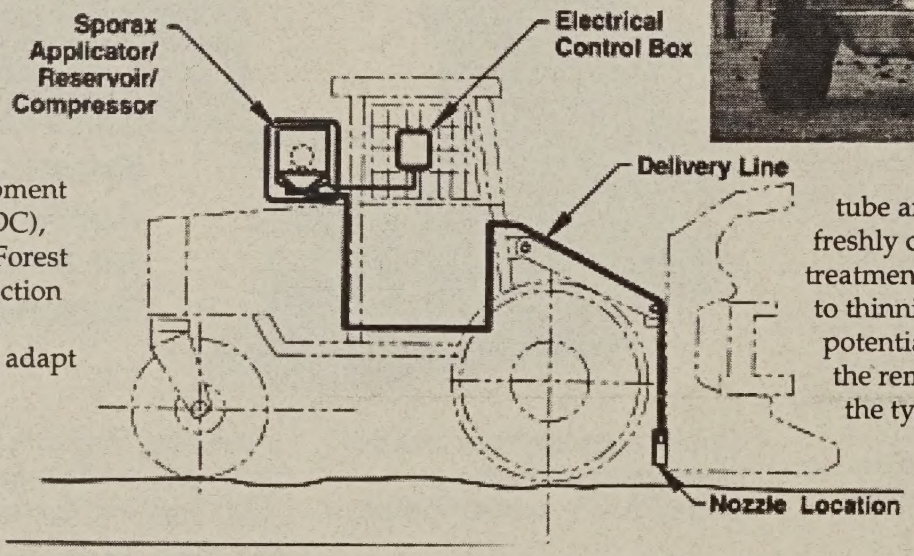
same operation? It could be done, but it would take some engineering expertise which you don't have on your staff. What you need is a cadre of engineers on retainer. "Yeah, right," you say. " Dream on."

This scenario is not as impossible as it sounds. As a matter of fact, Forest Health Protection staff members do have engineers on retainer to help develop special equipment. An Enterprise Team partner, Missoula Technology and Development Center (MTDC), works with Forest Health Protection specialists to develop and adapt technologies with real practical value in improving forest health. And small projects can be as valuable as large ones. The Sporax Applicator for Feller-Bunchers is a case in point.

MTDC recently developed a stump applicator system which attaches to feller bunchers and applies a granular formulation of borax to the stump immediately after the tree is severed. Developed by collaboration between MTDC engineer Dick Karsky and Southern Research Station plant pathologist Michelle Cram, under the leadership of MTDC Forest Health Protection Program Leader Harold Thistle, the system was demonstrated at the Department of Energy Savannah River Site National Environmental Research Park in August 1998.





The system uses an applicator attachment mounted on the back of a feller-buncher saw head. The applicator uses compressed air to blow borax powder from a metering mechanism through a tube and nozzle onto the top of a freshly cut stump. Although the treatment adds some time and cost to thinning an area, it has the potential to reduce mortality of the remaining trees by up to 7%, the typical mortality rate in areas where *H. annosum* root rot is a major problem.

The modular system design allows timber harvesters to adapt the applicator to virtually any feller-buncher. During timber harvest, the operator of the feller buncher cuts the tree, positions the nozzle of the applicator over the stump, and activates the Sporax application system, which applies Sporax to the stump. Tests in September 1997 and May 1998 on a 29-acre tract showed that stumps treated with the system retained enough boron to prevent annosum root rot. Analysis by the University of Georgia Cooperative Extension Service to determine the retention of boron at the Savannah River site showed that where the nozzles were properly placed, sufficient

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ENTERPRISE TEAM UPDATE

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boron remained on the stump even though a rain shower came through during the application.

The Sporax Application system for feller-bunchers is just one project developed by MTDC for Forest Health Protection specialists. Cooperation between MTDC and Regional and field forest health personnel can solve specific problems and, by leveraging resources, provide good value from a small project.

For more information on the Sporax Applicator for Feller-Bunchers and other Forest Health Protection solutions developed by MTDC, contact Harold Thistle, Missoula Technology & Development Center, Fort Missoula, Building No. 1, Missoula, MT 59801. Phone: 406-329-3900; Fax: 406-329-3719; e-mail (Forest Service) hthistle/wo,mtdc; e-mail (outside Forest Service) hthistle/wo_mtdc@fs.fed.us. See sidebar this page for a list of 1998 publications. (Please contact MTDC for copies of publications.)

Shirley Wilsey
Autometric Service Company

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You have a friend in engineering! MTDC is your "engineer on retainer" for FHP needs.

MTDC Forest Health Protection Program1998 Publications

Karsky, RJ; Cram, M; Thistle, H. 1998. A dry powder borax stump applicator for a feller buncher. ASAE Technical Paper #987023. St. Joseph (MI): American Society of Agricultural Engineers.

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Thistle, HW; Jasumback, A; Kilroy, W. 1998b. Practical applications of GPS technology: differential GPS spray aircraft guidance. Proceedings of the North American Conference on Pesticide Spray Drift Management. Portland ME: University of Maine Cooperative Extension.

Thistle, HW; Teske, ME. 1998. Real-time, aircraft based estimation of spray drift: drift algorithms. ASAE Technical Paper #981027. St. Joseph (MI): American Society of Agricultural Engineers.

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Director, from page 1

experience as Staff Officer, District Ranger, and silviculturist, but also, early in his career, time spent with the Colorado State Forest Service. As one who has been in the position occupied by end-users of Forest Health Protection (FHP) products and services, he has insight into the issues that confront people in the field and a strong desire to build more bridges between field offices and the Enterprise Team.

His more recent experience suggests the approach he will be taking to lead the Enterprise Team into the 21st century. As one of the leaders of the Creating Opportunities (CROP) research study on the Colville National Forest, he learned the importance of having true collaboration with all participants and how that produces results for the project and builds relationships for the future.

CROP is a study of small-diameter forests created by extensive wildfire in the 1920s and 1930s located on the Colville National Forest in northeastern Washington. The Colville National Forest, Pacific Northwest Station, University of Idaho, Washington State University, local industry, and others are conducting its first phase. The ongoing study, which began in 1997, seeks to determine how various silvicultural treatments and harvesting technologies can be used to create a sustainable forest that is healthy, productive, and diverse, while also providing products and income to local communities.

The study is now moving into its second stage, from stand-level research to an investigation of landscape-level questions. Another watershed within the forest has been selected where research will start to focus on the issues of how to manage landscapes long-term, how to sustain them, and what is the role of small-diameter timber in these larger landscapes. Another significant charge in the second phase is adoption of a "collaborative learning" model which is to be guided by Washington State University cooperators Keith Blatner and Matt Carroll.

The collaborative learning model introduces some new ideas into Forest Service practices of involving the public. It is a strong break from "creating a plan and sending it out for public review." "Collaborative learning gets the public and other collaborators involved at ground zero," says Mason. Everyone learns about the watershed together,

"Collaborative learning gets the public and other collaborators involved at ground zero."

before alternatives are proposed. A wider range of possible solutions and greater "buy-in" on the part of the various interested parties are obvious advantages of the procedure. The process is also unique in that it frequently begins with a social assessment of people who have an interest in the project in addition to the traditional natural resource assessment of the area.

Applying the concepts of collaborative learning to Enterprise Team projects will be the hallmark of Mason's leadership style.

Several successful FHP programs are already collaborations between the Enterprise Team and FHP field offices and Regional offices. The Special Technology Development Program (STDP), a program for funding field projects, works very closely with its collaborators through its steering committee. Also, Pest impact models, such as the Western Root Disease Model, depend on direct field participation in model development for their long-term success.

Applying the concepts of collaborative learning to Enterprise Team projects will be the hallmark of Mason's leadership style.

Mason recognizes that his National Forest and State Forest experience and end-user perspective will be valuable to the Team. However, he also knows that he has much to learn about the many projects and people in the broad area of Forest Health Protection. "I look forward very much to meeting people and 'building bridges,' learning about current Enterprise Team projects, and pursuing new technology development opportunities that fit within our mission and strategic goals."

In the short-term, for the next six to twelve months, Mason plans to focus on four tasks:

- Learning about Enterprise Team programs and projects from the team members. *Who are our end users? Who are our collaborators and cooperators? How does the project*

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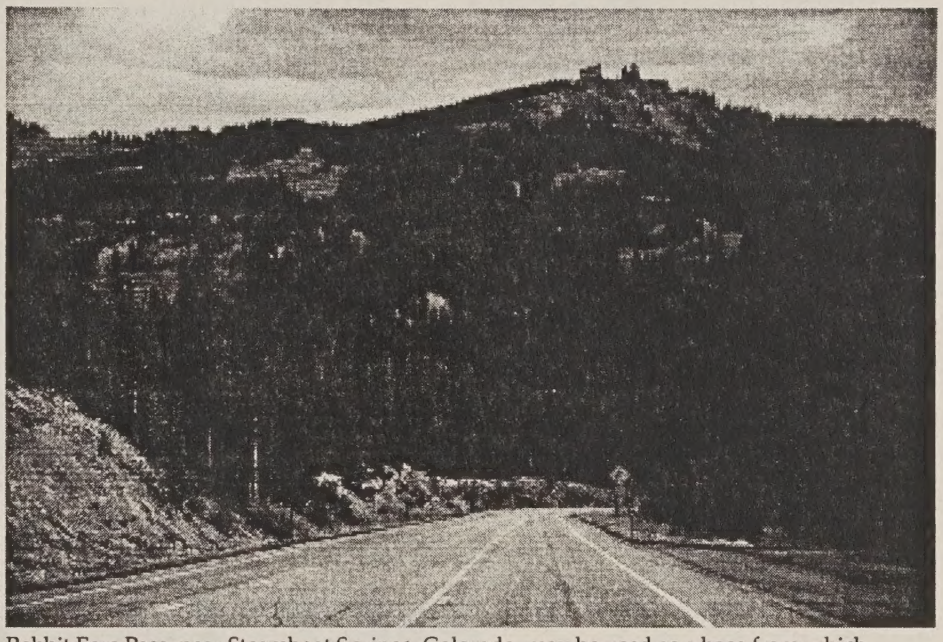
Blowdown plus beetles equals possible forest threat: Team to provide data viz

Last October, an early winter storm with winds estimated at 120 miles per hour caused a massive blowdown of trees in the Routt National Forest in Northern Colorado. Approximately 20,000 acres of wilderness and non-wilderness areas were affected. Forest managers are now concerned about long-term effects of the blowdown. An event such as this provides prime habitat for spruce beetle. Entomologists fear that under these conditions spruce beetle populations may build to the point of a serious outbreak, causing the beetles to move from the downed trees to the surrounding healthy forest.



USDA Forest Service

Rabbit Ears Pass, near Steamboat Springs, Colorado, may be used as a base from which visualization of effects of a beetle outbreak can be constructed.

Specialists in Region 2 are interested in using data visualization techniques to depict the possible future condition of forest areas near the blowdown sites. The Enterprise Team has been involved with similar projects on the Dixie National Forest in Utah and the Tongass National Forest in Alaska. In early October, specialists from Region 2, the Routt National Forest, and the Enterprise Team met in Steamboat Springs to visit a number of sites viewed as susceptible to a future beetle outbreak. One objective of the meeting was to collect ground photography of a number of study sites. These photographs will be used as baseline information from which the visualization will be constructed. Similar projects used a series of action and no-action scenarios to depict the progression of beetle damage over time with various possible management options.

Regional specialists hope the visualizations will assist in educating public groups about the possible effects of spruce beetle in and around Steamboat Springs. They may also be used as part of the NEPA (National Environmental Policy Act) reporting process. This project is in the very early stages; watch future editions of the Update for more information about how the Enterprise Team's data visualization capabilities help forest managers deal with the consequences of such events.

Jeanine Paschke
INTECS International

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"If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota in the course of aeons has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."

Aldo Leopold

Biological Control Program lists projects, accomplishments for FY 1998

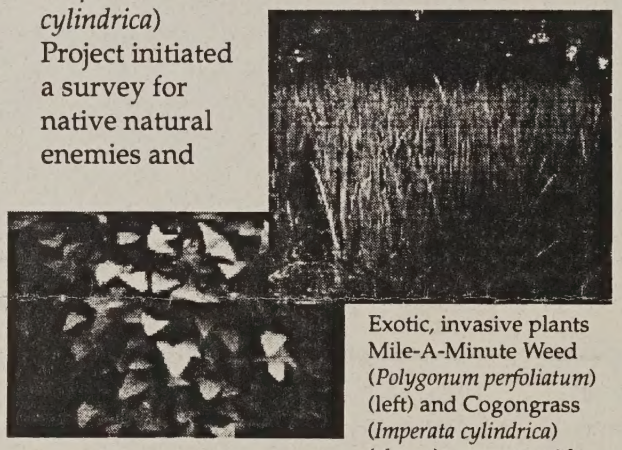
The Enterprise Team Biological Control Program in Morgantown, W.V., sponsors or assists with a variety of projects to combat exotic and native invasive plants and exotic and native arthropod pests which may upset ecological balance or threaten native or useful species in forests. Although projects are undertaken in order to safeguard the health of American forests, the work often involves cooperation with forestry agencies and personnel around the world. All of the projects have numerous cooperators.

The *Oracella* project was successfully completed in Fiscal year 1998. Done in cooperation with foresters in China, it concerned control of the pine mealybug (*Oracella acuta*), introduced into China from the U.S. This mealybug attacks pines that, though exotic to China, are of economic significance in Chinese forestry. The project collected three species of parasites of the pine mealybug in U.S. and shipped them to a rearing facility in China, where they were successfully reared and field released.

Of eight projects continuing into fiscal year 1999, four involve invasive weeds: mile-a-minute weed, cogongrass, dyer's woad, and Japanese knotweed.

The Mile-A-Minute Weed (*Polygonum perfoliatum*) Project seeks natural enemies to control an exotic plant that competes with native vegetation in the eastern U.S. This project surveys for natural enemies in China and the U.S. More than 60 natural enemies have been recovered to date. Three of the most promising exotic species are being reared in the laboratory and tested on host ranges in China. In addition, one pathogen and one lepidopteran are currently being studied in quarantine facilities in the U.S.

In Fiscal year 1998 the Cogongrass (*Imperata cylindrica*) Project initiated a survey for native natural enemies and continued to monitor plots demonstrating individual and combinations of presently available control strategies. The most effective control strategies will be combined with forest management practices for maintaining desirable plant communities.



Exotic, invasive plants Mile-A-Minute Weed (*Polygonum perfoliatum*) (left) and Cogongrass (*Imperata cylindrica*) (above) compete with native vegetation in the U.S. Enterprise Team programs seek natural enemies for their biological control.

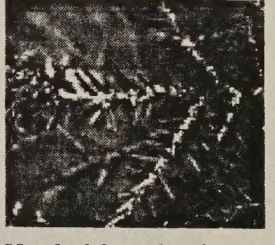
The Dyers Woad (*Isatis tinctoria*) project continued laboratory and field trials using a native fungus to reduce populations and spread of the weed, a threat to native plants in the western U.S. The Japanese knotweed (*Polygonum cuspidatum* = *Raynoutria japonica*) project initiated a preliminary survey for native natural enemies of the weed. This survey is also designed to quantify the impacts of natural enemies on *R. japonica*.

A new exotic weed project for fiscal year 1999 is a project to assist in the search for natural enemies of kudzu (*Puerania lobata*) which grows rampant in the southern U.S. The search for natural enemies will be carried on in China, native territory to kudzu.

Four ongoing biological control projects concentrate on the control of exotic arthropods.

The Team contributed to efforts to control the horntail *Sirex noctilio* in Brazil and elsewhere in South America. This introduced horntail damages pine plantations of high economic significance in several South American countries. Two species of hymenopteran parasites and one nematode parasite are being reared in the laboratory and field released.

The hemlock woolly adelgid (*Adelges tsugae*) (HWA) is a significant threat to native hemlock trees in the eastern forests of the U.S. The HWA project involves the laboratory rearing in Connecticut and New Jersey of an exotic beetle predator, *Pseudoscymnus*



Hemlock branch infested with Hemlock Woolly Adelgid (*Adelges Tsugae*)

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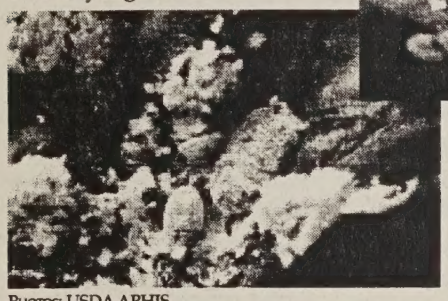
tsugae, which is native to Japan. More than 90,000 beetles were released in New Jersey, Connecticut and Virginia in Fiscal year 1998.

The Enterprise Team Biological Control Program also contributes to efforts to control the pink hibiscus mealybug (*Maconellicoccus hirsutus*) in Puerto Rico. In fiscal year 1998 scientists released two species of parasites in Puerto Rico, as well as publishing a leaflet and pocket-sized pest alert card on the pink hibiscus mealybug in both English and Spanish. A cooperative agreement was initiated with the University of Puerto Rico to develop control strategies to protect nursery stock and forest trees.



Right: Parasite wasp *Anagyurus kamali* lays eggs in pink hibiscus mealybug larvae; hatchlings feed on mealybug.

Left: Adult female pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green) (at center) with egg masses and immatures.

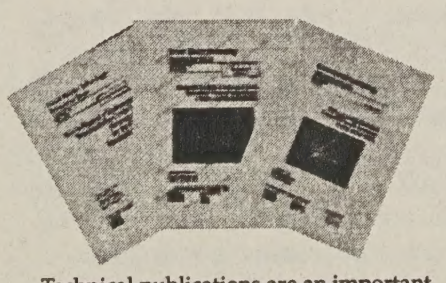
PHOTOS: USDA APHIS

The Beech Scale (*Cryptococcus fagisuga*) project completed a literature review and scientist contacts in 1998. An expert on biological control of scales and associates has been identified in China, and the survey for natural enemies and documentation of their impact has begun.

One aspect of biological control is the impact of biological control efforts on native insects which are not the target of control. An Enterprise Team biological control project is ongoing to study the impact on native lepidopterans of an exotic polyphagous (over 200 recorded hosts) tachinid parasite previously released to control gypsy moth. The study established that the tachinid *Compsilura concinnata* is affecting native lepidopterans such as spicebush swallowtail and Prometheus moth.

An important component of the Biological Control Program is publication of technical information to assist in the transfer of biological control technology. Four publications completed in fiscal year 1998 focused on providing documentation of previous attempts to use biological controls to manage forest pests and recommendations for future biological control efforts:

- *Biological control of arthropod forest pests of the western United States: a review and recommendations*, by Bellows, Meisenbacher, and Reardon
- *Classical biological control of pest insects of trees in the southern United States: a review and recommendations*, by Frank and Foltz
- *Biological control of arthropod pests of the northeastern and north central forests in the United States: a review and recommendations*, by Van Driesche, Healy, and Reardon
- *Pathogens and microbial control of North American forest insect pests*, by Fuxa, Ayyappath, and Goyer



Technical publications are an important contribution of the Enterprise Team Biological Control Program.

In addition, the Enterprise Team assisted in the publication of two proceedings for conferences: *Training in the Control of Sirex noctilio by the use of natural enemies*, proceedings of a conference held in Colombo, Brazil in November 1996, was published in English and Spanish or Portuguese. *Biological weed control*, proceedings of a conference sponsored by Interagency Noxious Weed Symposium in Corvallis, Oregon in December 1997, will be published in December 1998.

In preparation is a handbook that will summarize the extent and significance of exotic invasive plants in forests east of the Mississippi, including past attempts at biological control as well as recommendations for future efforts.

For more information about these projects and for copies of the publications noted above, contact: Richard C. Reardon, USDA Forest Service, Forest Health Technology Enterprise Team, 180 Canfield St., Morgantown, WV 26505 (e-mail=rreardon/na_mo@fs.fed.us). See also the Mile-a-Minute Weed web site at http://www.fsl.wv.edu/fhtet/mam.

Richard C. Reardon
USDA Forest Service

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Iverson leads initiatives for pesticide use reporting, web pages, Year 2000 compliance

Enterprise Team Program Leader Loren Iverson, who joined the Team early this fall, is working to create an "upward" reporting system for the Pesticide Use Reporting System (PURS), one of the Team's core support programs for Forest Health Protection's Washington Office. PURS is a database of pesticide use information collected from the USDA Forest Service Regions and the Northeastern Area. From this database, the Team produces an annual Pesticide Use Report, a summary report of pesticide use on National Forest lands containing active ingredients, target pest or purpose, quantities used, and units treated for each pesticide. In table form, this report is part of the Annual Report of the Forest Service.

The Team developed an Oracle database application on the DG to manage the data and produce the report. The database was moved to the Forest Service corporate IBM platform earlier this year in order to open the door for increased access to the data by the Washington Office and other Forest Service personnel. Since the Oracle structure is already in place, Iverson's new initiative will be to choose the most efficient approach for the PURS reporting system. Using the Internet for data transfer is one possibility under consideration. A common Applix spreadsheet that addresses both Regional and National needs was developed for the fiscal year 1998 report. Field units will enter pesticide data in a standard format, so no reentry of data will be required by the Enterprise Team. Previously, field offices collected the data and transferred it to Regional Offices. The Regions then sent the data on to the Enterprise Team, where it was reentered into the PURS Oracle database.

Loren Iverson leads PURS, WWW, Y2K and other programs for the Enterprise Team.

Iverson also has leadership responsibilities for the Enterprise Team's "web" efforts. Within the coming year, the Team will develop its Home Page for the Forest Service Web. Under his leadership, the Team will continue to enhance and maintain its WWW Home Page. In addition, the Team maintains the Forest Health Home Page, though the Washington Office will eventually take over that responsibility. In the coming year Iverson will also give attention to the Team's Year 2000 certification process and provide the computer hardware and software necessary for Team operations.

Shirley Wilsey
Autometric Service Company

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EPA approves reregistration of microbial products

As a part of its responsibilities in pesticide registration the Enterprise Team has successfully reregistered with the Environmental Protection Agency two microbial products developed by the Forest Service and cooperators: Gypchek, a virus specific to the gypsy moth, and TM-Biocontrol, a virus specific to the Douglas-fir tussock moth. Both products are still labeled for wide area public pest control programs sponsored by government entities. However, the labels for each product now include both aerial and ground applications for forest trees and ornamental or non-commercial trees in urban parks, golf courses, lawns, and landscapes. The new labels and MSDS revisions are available upon request. For more information, please contact John D. Stein, Impacts and Pesticides Program Manager, Forest Health Technology Enterprise Team, USDA Forest Service, 180 Canfield St., Morgantown, WV 26505. Phone: 304-285-1563; Fax: 304-285-1564; Forest Service e-mail: jstein/na,mo; e-mail: jstein/na_mo@fs.fed.us.

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accomplish our mission and goals of our strategic plan?

- Getting out into the field to meet with FHP field people to get their perspectives and learn from them about team projects and programs. *Are the things we're doing useful to them and their clients?*
- Meeting with current and potential enterprise clients. *How does this project fit within our mission and help accomplish the goals in our strategic plan? Can we meet the clients' expectations on a competitive and cost-reimbursable basis?* Two major current projects, the Research Budget and Attainment Information System (RBAIS) Project for Forest Service Research, and an aerial photography project for the Natural Resources Conservation Service, are enterprise projects.
- Working with the Enterprise Team, the Steering Committee, and others to finalize the 1999 Program of Work, the Strategic Plan, and the 1998 Accomplishment Report.

Mason stresses that, in addition to its responsibility to collaborate closely with field units and other end-users, there is another side to the Enterprise Team charge: the responsibility to be on the cutting edge of technology, even when broad-scale deployment and use may be several years in the future. Examples of this kind of Enterprise Team project are: INFORMS,a decision support software in development for a long time, whose uses are now becoming more widely recognized throughout the agency; and SmartForest, a data visualization tool that helps managers to communicate possible future outcomes of management choices. "We must continue to work on technology with long-term payoff," says Mason. "And finally, there is the issue of value. What the Forest Service does is deeply connected with a great range of values, held by a wide variety of people, about the management of our forests. The Enterprise Team, with the USDA Forest Service, must also be prepared to address these issues with our collaborators, our end-users, and the people of America."

"We must continue to work on technology with long-term payoff."

Shirley Wilsey
Autometric Service Company

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Team assists in study of Vermont forests

The Enterprise Team recently cooperated with the Vermont Agency of Natural Resources, Forests, Parks, & Recreation, and the USDA Forest Service Northeastern Area, State & Private Forestry, Forest Health Protection to produce a study of the health of Vermont forests. Ronald S. Kelley, Forestry Protection Specialist of Vermont Department of Forests, Parks & Recreation, is lead author of the study: *Vermont Hardwood Tree Health in 1996 Compared to 1991 and 1986*. Dr. Eric Smith, Quantitative Analysis Program Manager at the Enterprise Team, Susan M. Cox, Forester, Northeastern Area, and Bill Frament, Remote Sensing Specialist, Northeastern Area, are co-authors.

The study used a combination of aerial photography interpretation and ground plot examinations to track the health of Vermont's forests. The Enterprise Team took the aerial photographs.

The 1996 data showed a generally healthy forest. Since that time, more than 900,000 acres of forest land was damaged by the January 1998 ice storm. After a wetter than usual growing season in 1998, the color and appearance of leaves indicates less vigorous growth. The plots will be examined in 1999 to determine further effects of the storm.

For copies, contact the State of Vermont Agency of Natural Resources, Department of Forests, Parks, and Recreation, 103 South Main St. 10 South, Waterbury, VT 05671-0601.

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